

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

FILTER STRIP

(Acre)

Code 393

DEFINITION

A strip or area of vegetation for removing sediment, organic matter, and other pollutants from runoff and wastewater.

PURPOSE

To remove sediment and other pollutants from runoff or wastewater by filtration, deposition, infiltration, absorption, adsorption, decomposition, and volatilization, thereby reducing pollution and protecting the environment.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies (1) on cropland at the lower edge of fields or on fields adjacent to streams, ponds, and lakes, or above conservation practices such as terraces or diversions, (2) in areas requiring filter strips as part of a waste management system to treat polluted runoff wastewater, (3) on forestland where filter strips are needed as part of a forestry operation to reduce delivery of sediment into waterways.

FEDERAL, STATE, AND LOCAL LAWS

This standard is an addition to all federal, state, and local laws governing waste management, pollution abatement, and health and safety. The owner shall be responsible for obtaining all required permits and for compliance with such laws and regulations. Certification of compliance with this standard and specification **DOES NOT** ensure

compliance with other federal, state, and local requirements. Some of the state laws and regulations are filed in Chapter 1, Agricultural Waste Management Field Handbook (AWMFH).

Any work involving the discharge of dredged or fill material into wetlands or other waters of the United States may require a permit according to Section 404 of the Clean Water Act.

PLANNING CONSIDERATIONS

This practice is not a substitute for land treatment practices.

Evaluate type and quantity of pollutants, slopes and soils, adapted vegetative species, time of year for proper establishment of vegetation, necessity for irrigation, visual aspects, fire hazards, and other special needs.

Prevent erosion where filters outlet into streams or channels.

If filter strips are to be used in treating wastewater or polluted runoff from concentrated livestock areas, the following must be considered:

1. Adequate soil drainage to insure satisfactory performance.
2. Provisions for preventing continuous or daily discharge of liquid waste unless the area is adequate for infiltrating all daily applied effluent. Temporary storage should be considered to prevent discharge to the filter strip more frequently than once every three days.

3. Storage or alternating filter strips may be desirable to maintain an aerobic soil profile.
4. Reduced effectiveness of filter strips under snow or frozen conditions.
5. An adequate filter area and length of flow to provide the desired reduction of pollutants. A serpentine or switchback channel can be used to provide greater length of flow.
6. Provisions for excluding roof water and unpolluted surface runoff.
7. Slopes less than five percent are more effective; steeper slopes require a greater area and length of flow.
8. Provisions for mowing and removing vegetation to maintain the effectiveness of the filter area. While not generally recommended, controlled grazing may be satisfactory when the filter area is dry and firm.
9. The need for a level lip weir, gated pipe, sprinklers, gravel spreaders, or other facilities to distribute flow uniformly across the top of the filter strip and maintain sheet flow through the strip.

Filter strips that are a component of systems including paved lots for swine operations, careful consideration needs to be given to design due to the difficulties in removing the solids from the manure before the liquid enters the filter strips.

Filter strips as the final treatment for runoff will not meet the "no-discharge" requirement applicable to livestock operations requiring permits under the National Pollutant Discharge Elimination System (NPDES).

Pollution abatement measures more efficient than filter strips may also be necessary where receiving waters must be highly protected.

DESIGN CRITERIA

FILTER STRIPS FOR REMOVAL OF EXCESS SEDIMENT, NUTRIENTS, AND PESTICIDES

Filter strip flow length shall be determined based on field slope percent and length, and filter strip slope percent.

These criteria apply to filter strips adjacent to streams, ponds, lakes, wetlands (including seasonally inundated oxbows), sinkholes, tile inlets and agricultural drainage wells.

The minimum width of the filter strip shall be in accordance with the following table.

Land slope at the buffer site (%)

| | 0.5 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 |
|-------------------|-----|-----|-----|-----|---------|---------|
| Warm Season - Min | 20 | 25 | 35 | 45 | 55 | 60 |
| Cool Season - Min | 40 | 50 | 70 | 90 | 11 0 | 12 0 |

Maximum width of the filter strip will be determined by the client's objectives and program requirements.

Filter strips shall be planted to tall, stiff stemmed grasses. Legumes and forbs shall not exceed 50 percent of the mixture. Native species are preferred.

Filter Strips for Runoff from Concentrated Livestock Areas. These criteria apply to filter strips for feedlot and barnyard runoff.

A sediment basin or low velocity channel shall be provided between the waste source and filter strip for facilities having a capacity of more than 100 1,000-pound animal units. Such facilities should be considered for use with all filter strips.

The sediment basin shall be designed in accordance with the Conservation Practice Standard, Sediment Basin (350).

For waste management systems, level spreaders shall be constructed to distribute flow effectively across the filter strip (filter channel) in accordance with the following table:

TABLE 2. LEVEL SPREADER SPACING

| <u>Slope (Percent)</u> | <u>Maximum Spacing (Feet)</u> |
|------------------------|-------------------------------|
| less than 2 | 200 |
| 2 – 5 | 100 |
| greater than 5 | 50 |

A filter strip may be a relatively uniform grass area. Minimum dimensions shall be based on the peak outflow from the concentrated waste area or settling facility based on a 2-year, 24-hour rainfall.

Grass area filter strips shall be generally on the contour and sufficiently wide to pass the peak flow at a depth of 0.5 inches or less. Flow length shall be sufficient to provide at least 15 minutes flow through time.

Grass channel filter strips shall be designed to carry the peak flow at a depth of 0.5 feet or less. Flow length shall be sufficient to provide at least 30 minutes flow through time. Grass species and shape of channel shall be such that grass stems will remain upright during design flow.

The filter strip width or grass channel filter strip length needed to provide the minimum flow through time will be determined using grass filter design charts found in Chapter 10, Agricultural Waste Management Field Manual (AWMFM).

Filter Strips for Controlled Overland Flow Treatment of Liquid Wastes.

These criteria apply to filter strips for wastewater from milk parlors, milking centers, waste treatment lagoons, food-processing plants, and animal waste storage facilities where solids settling is not required.

Overland flow filter strips shall be installed on natural or constructed slopes of two to six percent. They shall have minimum flow lengths in accordance with Table 3. Weekly wastewater application rates should not exceed six inches with lower rates down to one or two inches for highly concentrated wastes. Daily application times should not exceed six hours with shorter times down to two hours for more concentrated wastes such as that from animal waste storage facilities. Filter strips should be rested at least two days each week.

TABLE 3. FLOW LENGTH THROUGH VEGETATED AREAS

| <u>Slope (Percent)</u> | <u>Minimum Length Of Flow (Feet)</u> |
|------------------------|--------------------------------------|
| 0-2 | 100 |
| 3 | 150 |
| 4 | 200 |
| 5 | 250 |
| 6 | 300 |

Filter Strips on Forestland. These criteria apply to filter strips for runoff as part of a forestry operation to reduce delivery of sediment into waterways.

As a guide, the length of flow through undisturbed forest floor should be as shown in Table 4. Longer flow lengths should be used as contributing drainage areas increase.

TABLE 4. FLOW LENGTH THROUGH FOREST AREAS

| <u>Slope (Percent)</u> | <u>Minimum Length Of Flow (Feet)</u> |
|------------------------|--------------------------------------|
| 0-15 | 50 |
| 15-30 | 65 |
| 30-45 | 100 |
| 45-70 | 150 |

OPERATION AND MAINTENANCE

Development of rills and small channels within filter areas must be minimized and needed repairs must be made immediately to re-establish sheet flow. A shallow furrow on the contour across the filter can be used to re-establish sheet flow. Vegetation must be maintained in a vigorous condition. If livestock have access to the filter area, it must be fenced to control grazing.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

The following list of Construction Specifications is intended as a guide to selecting the appropriate specifications for a specific project. The list includes most but may not contain all of the specifications that are needed for a specific project:

- IA-1 Site Preparation
- IA-3 Structural Removal
- IA-5 Pollution Control
- IA-6 Seeding and Mulching for Protective Cover
- IA-11 Removal of Water
- IA-21 Excavation
- IA-23 Earthfill
- IA-26 Salvaging and Spreading Topsoil
- IA-27 Diversions
- IA-45 Plastic (PVC, PE) Pipe
- IA-81 Metal Fabrication and Installation
- IA-83 Timber Fabrication and Installation
- IA-92 Fences